

Lesson2

Read 5.1

Area under the graph of a function

Right hand sum, left hand sum

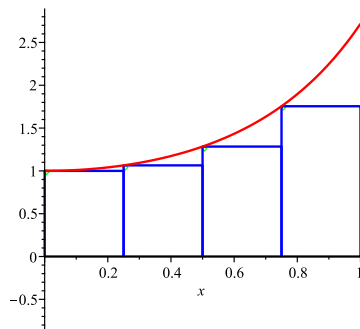
Area problem

Consider a function f over an interval $[a, b]$.

- ▶ n number of subdivisions.
- ▶ $\Delta x = \frac{b-a}{n}$.
- ▶ $x_0 = a$, $x_i = a + i\Delta x$ for $i = 1$ to n .
(note $x_n = b$).

Lefthand sum

$$L_n = \sum_{i=0}^{n-1} f(x_i)\Delta x =$$
$$= f(x_0)\Delta x + f(x_1)\Delta x + \cdots + f(x_{n-1})\Delta x$$

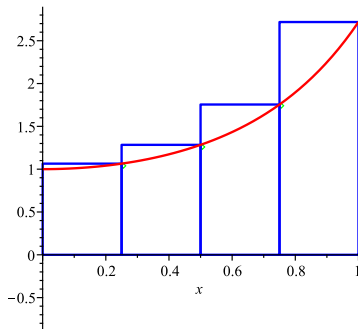


Partitions: 4

 $f(x)$

Right hand sum

$$R_n = \sum_{i=1}^n f(x_i) \Delta x = \\ = f(x_1) \Delta x + f(x_2) \Delta x + \cdots + f(x_n) \Delta x$$



Partitions: 4

$f(x)$

Example

Estimate the area under the graph of $f(x) = \frac{1}{x}$ from 1 to 2, using L_4 and R_4

Question: what happens when the number n of subdivision becomes bigger and bigger ?

What happens if the graph of f gets below the x -axis?

Problem

The velocity of a moving object is given by the following table. Give both an overestimate and an underestimate for the distance traveled by the object by the object in the time interval $t = 2$ to $t = 5$. Time is measured in hours, velocity in km/h.

t	0	1	2	3	4	5	6	7
V	40	45	50	45	30	20	18	10